

# NASA TECH BRIEF



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## Exposure Value (EV) System Expanded to Include Filter Factors and Transmittance

In the utilization of photography in research, unusual conditions are encountered that in some cases range from making exposures of about 0.01 second of objects having brightness levels of the order of 100 times brighter than a beach scene, to other unrelated situations. Generally for these conditions a correct exposure for a given time and film is determined experimentally and it is often required to transpose these settings to another one involving changes in film and exposure time. It appeared that this transposition could be accomplished more rapidly and with less restriction on the variation of the variables involved if an additive system such as the exposure value (or light value) system could be used.

This application of the exposure value system however required that the system be extended to high brightness level, and expanded to include filter factors. Exposure values especially in tabular form have been in steps of 1 or one stop. A minimum of four photographic factors are involved in the evaluation of an exposure which when determined from tables of 1-stop interval could introduce noticeable error. It was desirable therefore that the values be provided in 25-percent steps or quarter stops to permit an acceptable solution to be obtained more readily. The initial study in 1960 produced numerical values in 0.25 increments of exposure for each of the following photographic factors: f/number, exposure time, film speed, object brightness, and filter factor. Since then the

analysis has been expanded to include the factors involved in photoflash and electronic flash photography.

"An Expansion of The EV System," by W. F. Lindsey, Langley Research Center, a paper presented at the 10th Annual Technical Symposium of the Society of Photo-Optical Instrument Engineers, San Francisco, August 16-20, 1965, describes the derivation of the equations relating the photographic factors for both basic photography and flash photography. These equations are converted into an additive value system that is a duplicate of or is compatible with the exposure value system. Tabulated values are presented of the photographic factors and their corresponding values in the additive system which permit the application of the expanded system to photographic problems within ranges wherein the reciprocity effects are approximately constant.

### Note:

Copies of this paper may be obtained from:  
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### Patent status:

No patent action is contemplated by NASA.

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